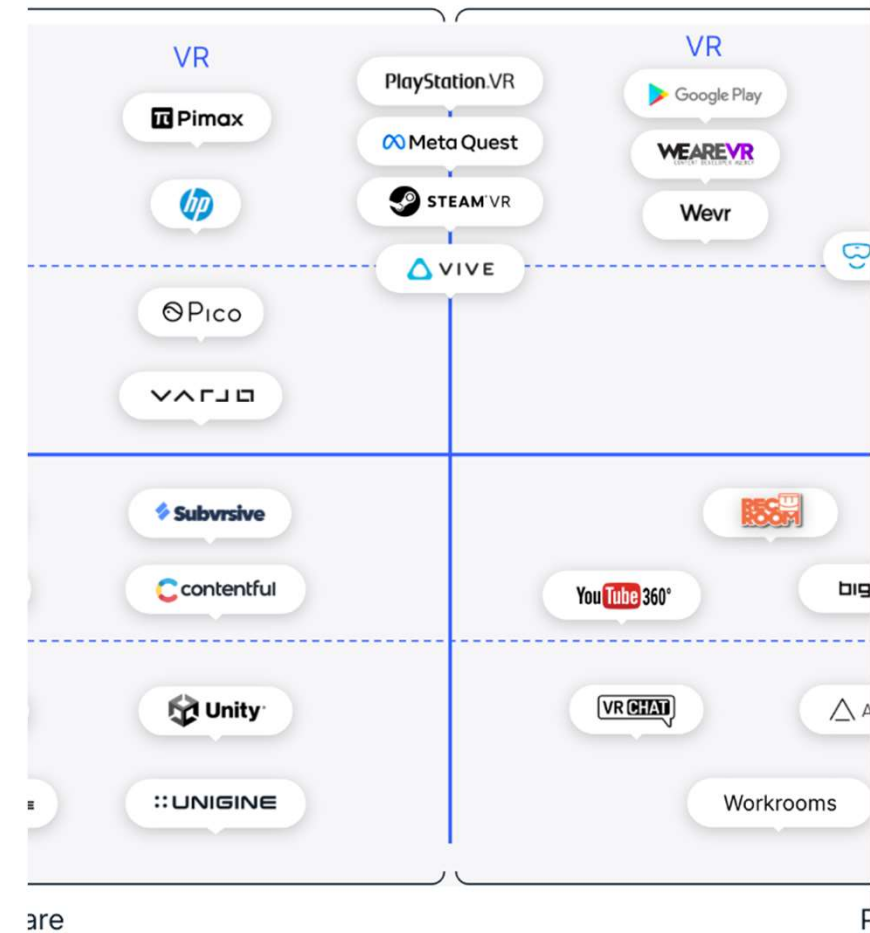


# The World of Augmented Augmented Reality

Welcome to a world where virtual and physical reality merge to create an immersive user experience like no other. In this presentation, we will explore the history, architecture, and algorithm of augmented reality, as well as its related fields.

 by Poornima S

## AR/XR Landscape & Position



# What is Augmented Reality?

## Definition and Scope

AR enhances the real world with computer-generated visuals, sounds, and information. It can be delivered through headsets, smartphones, and wearables.

## How does AR work?

AR integrates the user's physical environment with digital information. This is achieved through computer vision and object recognition, and is often location-based.

## A Brief History of AR

AR dates back to the 1960s, but it wasn't until the advent of smartphones that it became more widely available. Today, AR is used in fields such as education, entertainment, and retail.

## Examples of AR in use today

AR has exploded in popularity in recent years, with apps like Pokemon Go and Snapchat leading the way. Other industries, such as healthcare and engineering, are also embracing AR technologies.

# The Definition and Scope of AR

## A New Reality

Augmented reality (AR) is a technology that overlays computer-generated visualizations on the real world, enhancing the user's perception of their surroundings. AR has vast potential for a wide range of applications, from education to entertainment, marketing, and beyond.

## Augmentation of Senses

AR is not limited to just visual enhancement but has the potential to enhance all our senses. Smell, sound and even touch can be augmented, creating a fully immersive experience that blurs the line between physical and virtual realms.

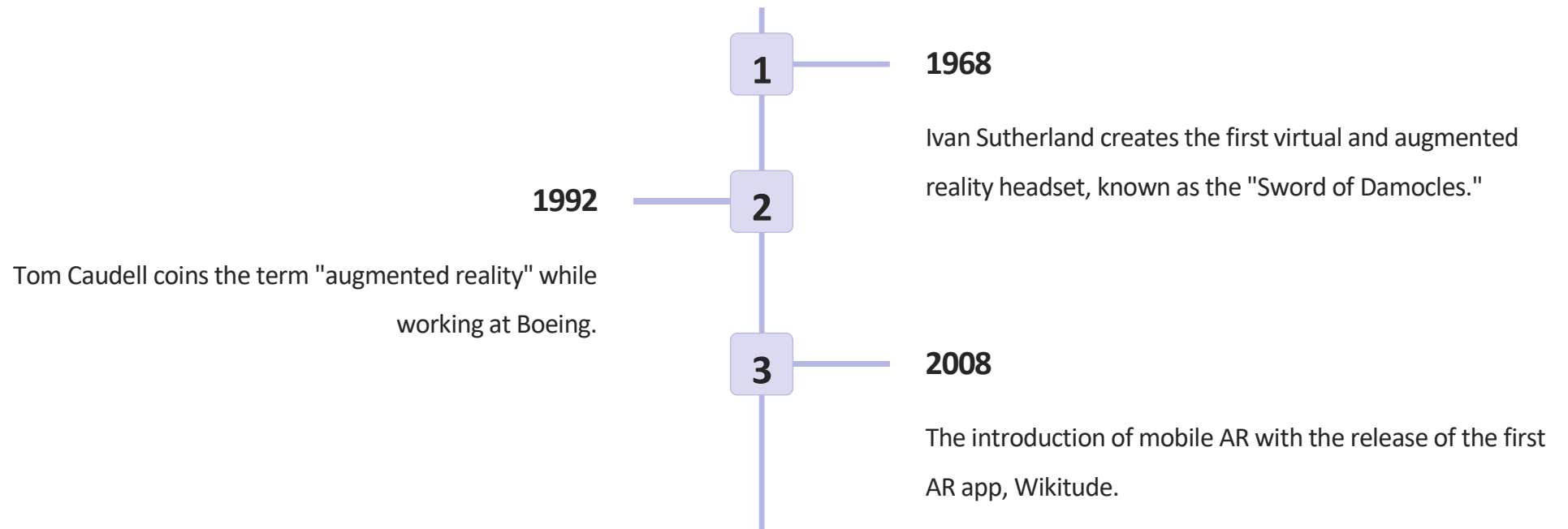
## Limitless Possibilities

The scope of AR is virtually limitless, with potential across countless industries, from medical sciences to gaming and retail. AR is an incredibly powerful tool that can connect consumers with brands and products in entirely new and exciting ways.

## Impact on the Rising Generation

AR has the potential to transform the way we learn and interact with information. Future generations will be able to learn in ways never before imagined, revolutionizing education and beyond.

# The Brief History of AR



# The Architecture of AR



## AR Devices

A display device allows the user to interact with the virtual world and overlay on the real world. Common AR devices include head-mounted displays, smartphones, and glasses.



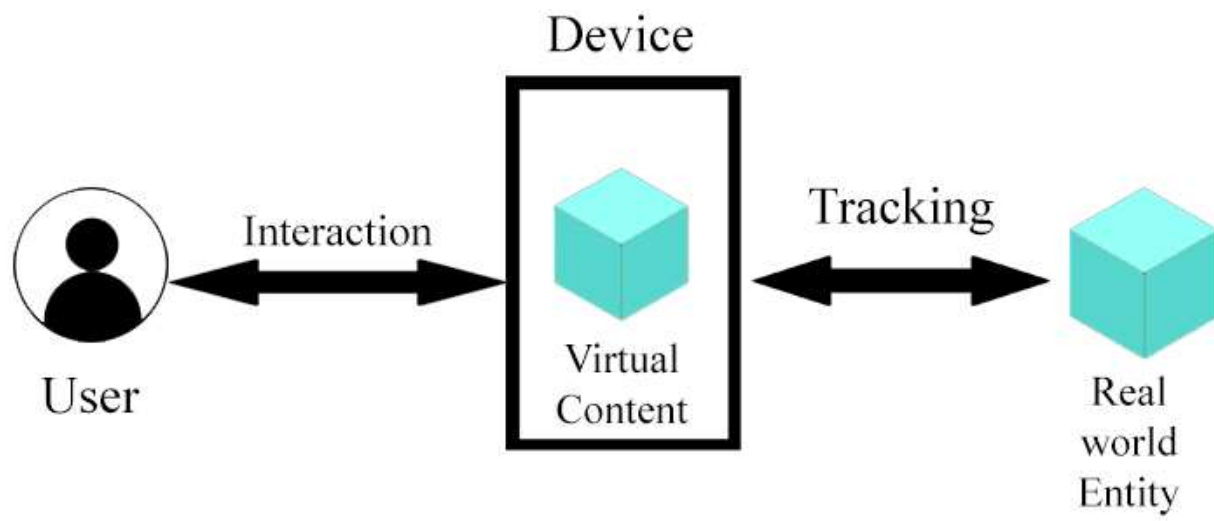
## AR Markers

The AR marker is a key identifier, which specifies the position of virtual objects in relation to the real world. AR markers can be images or symbols captured by the device's camera.



## AR Software

AR software processes real-time data and produces virtual objects to be superimposed on the marker. The software playback is generally provided via an app or web browser.



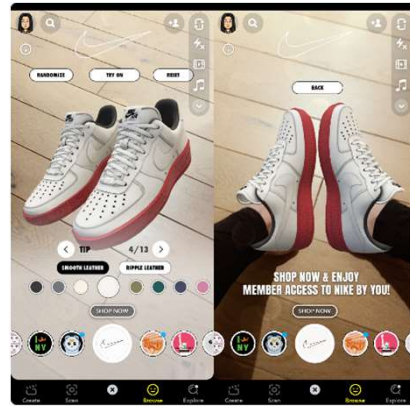
Augmented Reality Architecture

# Advantages and potential for business applications



## Collaboration

AR can facilitate collaboration and training by enabling remote workers to access real-time information in a shared virtual environment.



## Marketing and Sales

AR can be used to enhance product information and create interactive shopping experiences, thereby increasing customer engagement and sales.



## Healthcare

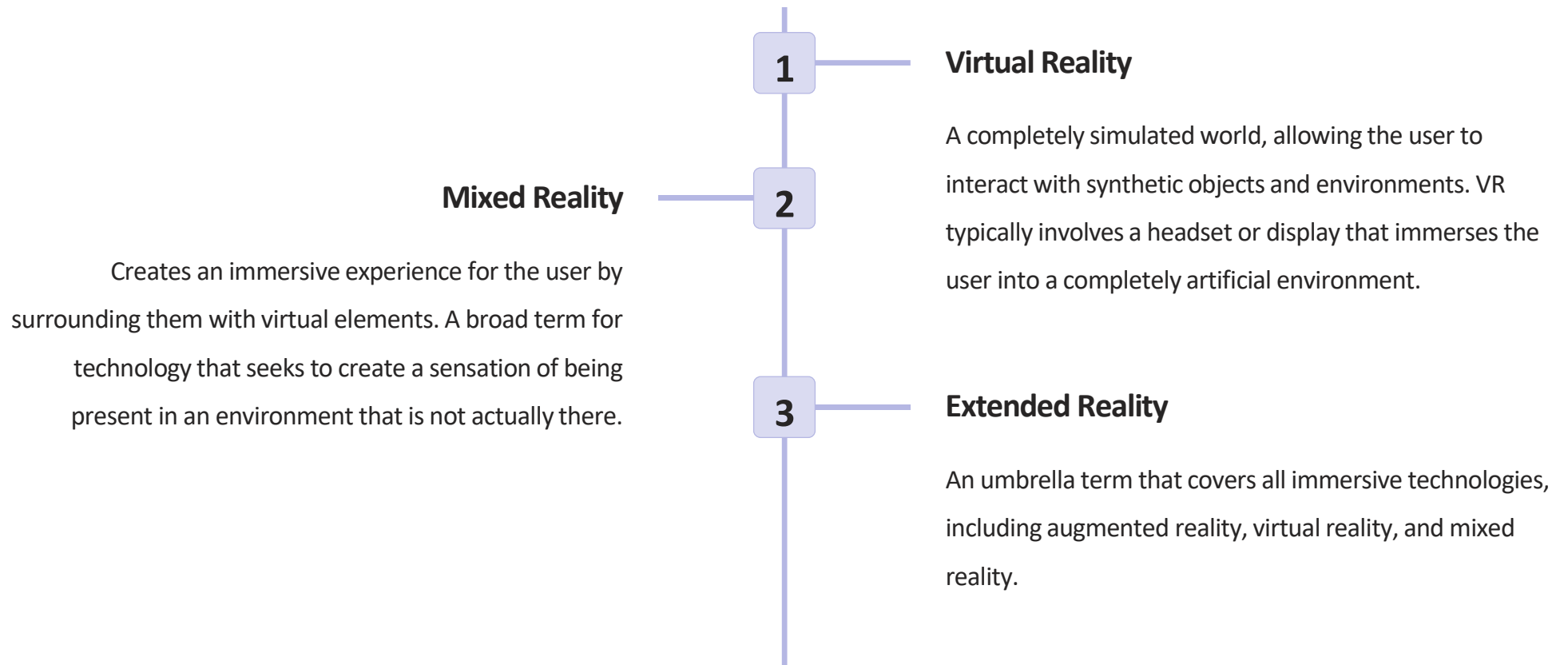
AR is being used to improve medical procedures by enhancing training and assisting with surgical procedures, resulting in better patient outcomes.



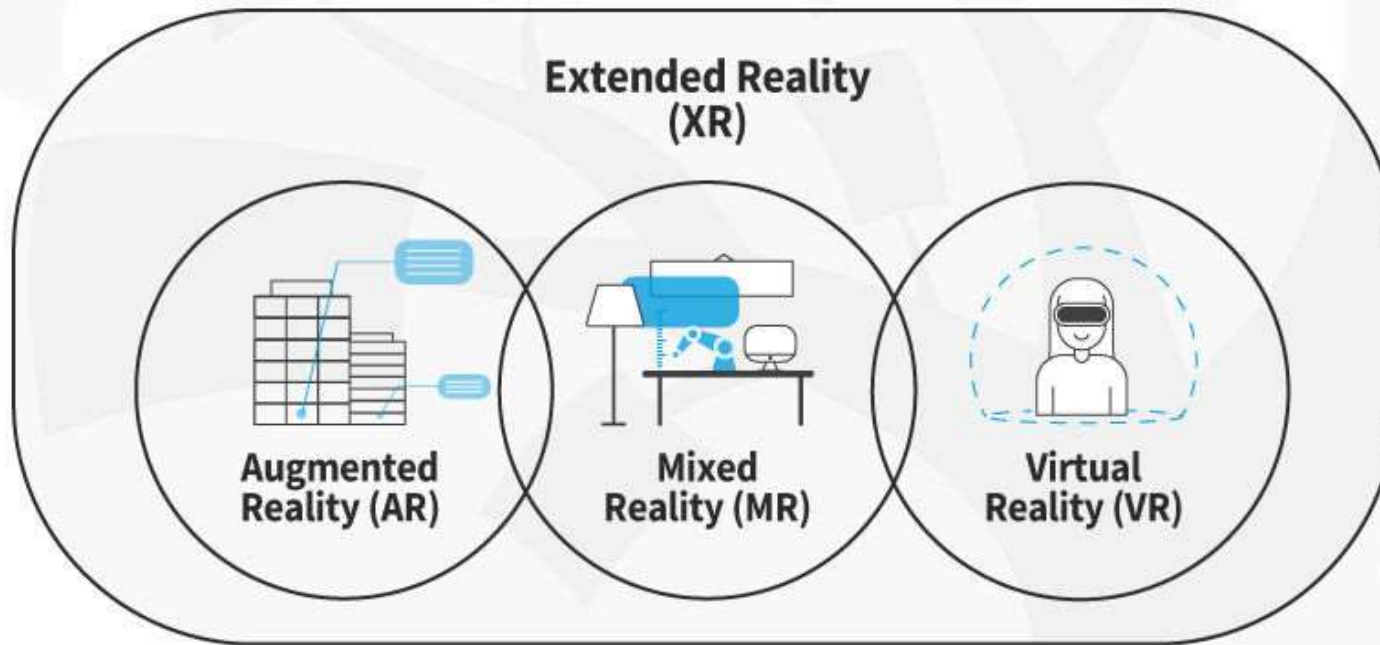
## Tourism and Travel

AR can be used as an interactive guide, enriching cultural experiences by providing historical and cultural information in real-time.

# Related Fields of AR

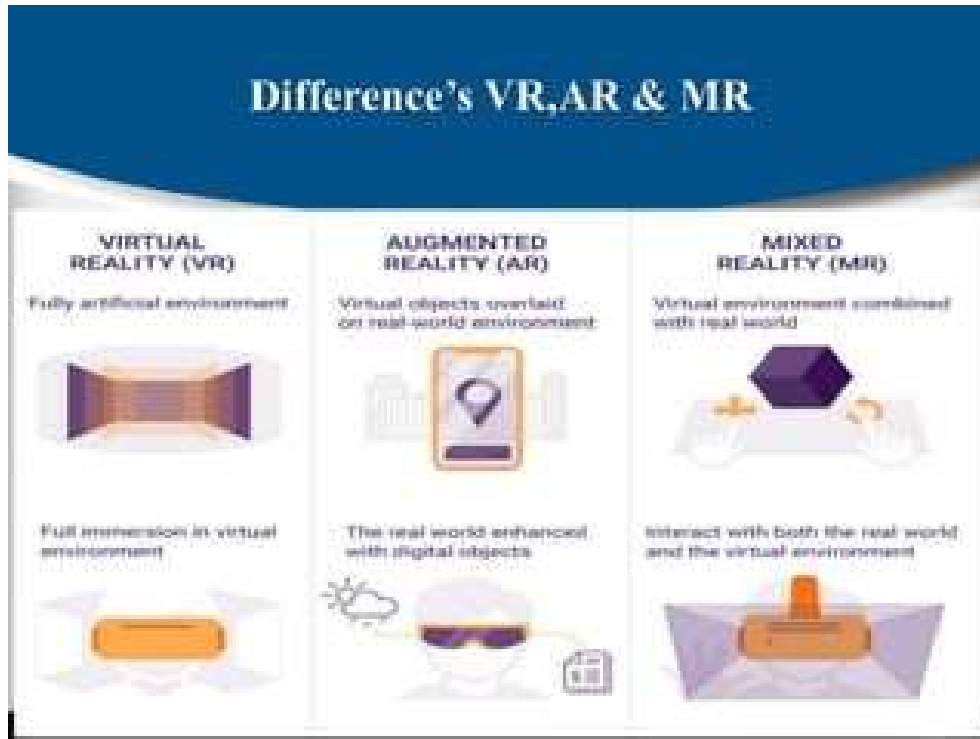






- VR is immersing people into a completely virtual environment
- AR is creating an overlay of virtual content, but can't interact with the environment
- MR is a mixed of virtual reality and the reality, it creates virtual objects that can interact with the actual environment.
- XR brings all three Reality (AR, VR, MR) together under one term.



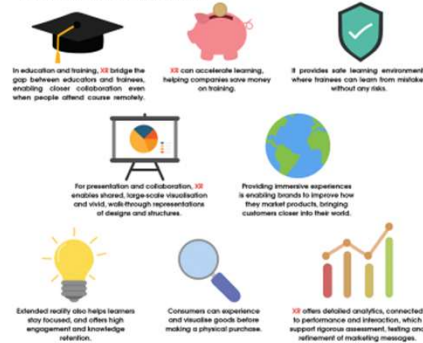


## XR EXTENDED REALITY

Extended reality (XR) is an umbrella term referring to all real-and-virtual combined environments and interfaces generated by computer technology. It includes Augmented Reality (AR), Mixed Reality (MR) and Virtual Reality (VR). "XR isn't about the future - it's already here", says Thomas Wölter, Section Manager, Strategic Product Marketing of NEC Display Solutions Europe.

### WHAT ARE THE ADVANTAGES OF XR?

Extended reality (XR) technology is playing more of a prominent role in different industries and sectors, providing clear benefits in many aspects of work and business, including training, collaborative working and marketing.



## AR AUGMENTED REALITY

Augmented reality (AR), on the contrary, does not give a complete immersion. AR adds digital elements to a live view often done by using the camera on a smartphone or tablet. Augmented reality experiences and games include for example apps like Pokemon Go or devices like the Snapchat lenses.

### WHAT ARE THE ADVANTAGES OF AR?

Augmented reality (AR) offer a broad range of applications for enterprises and organisations.



## VR VIRTUAL REALITY

Virtual Reality might be the one you are most familiar with. VR is the term used to describe a three-dimensional, computer-generated environment which can be explored and interacted with by a person. That person is immersed within this virtual environment and in most cases is able to manipulate objects or perform a series of actions. Many people know VR through the use of Head-Mounted Devices (HMD) like the Oculus Rift, HTC Vive, or Google Cardboard.

### WHAT ARE THE ADVANTAGES OF VR?

In research and development, design and review and education and training, virtual reality (VR) offer a broad range of applications for enterprises and organisations.



## MR MIXED REALITY

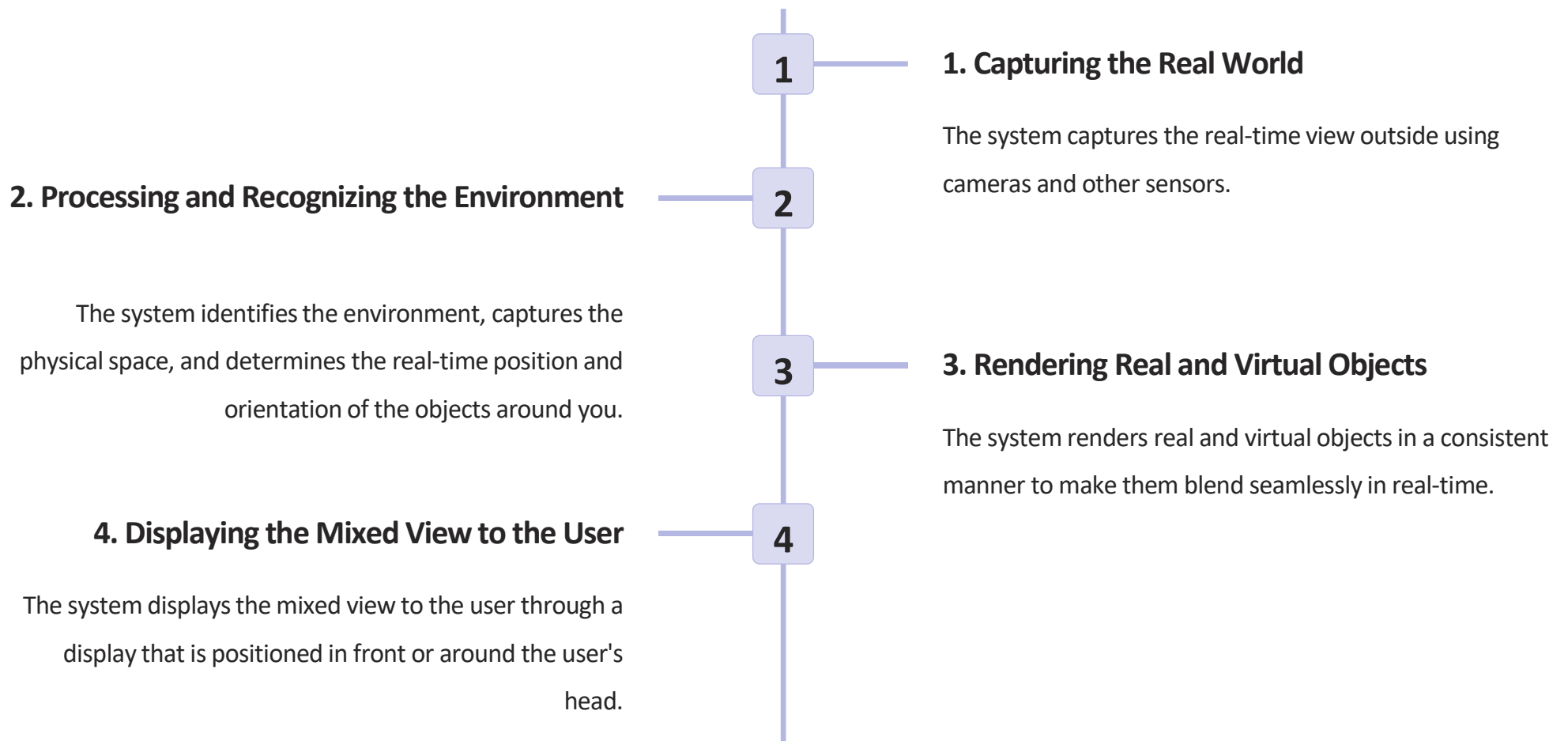
Mixed Reality blends elements of both AR and VR, where physical and digital objects co-exist and interact in real-time. It allows the user to interact with combined virtual and real objects. Examples of MR include games like Halo Infinite or apps such as HoloTour.

### WHAT ARE THE ADVANTAGES OF MR?

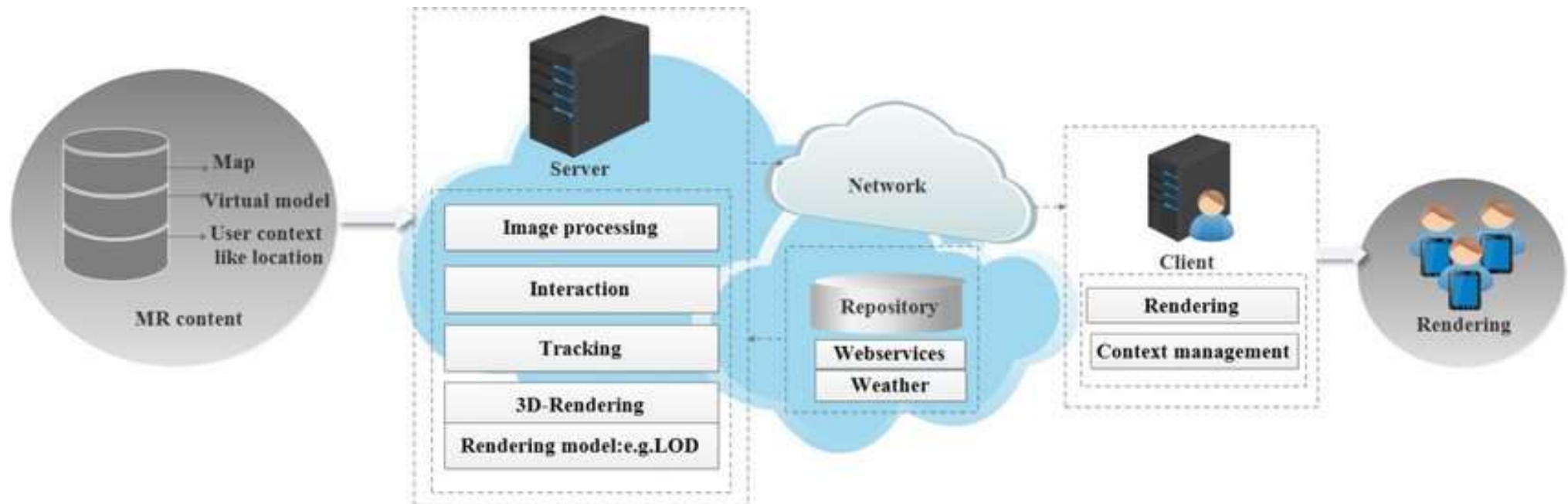
MR's combination physical and digital is making significant changes to the mainstream in various industries, including manufacturing, design and construction, medical, education and research.



# The General Architecture of Mixed Reality System



## Sample Architecture of a Mixed Reality system



# General Algorithm Steps for Mixed Reality

## 1 Mapping the Environment

The first step in mixed reality involves mapping the physical environment using a blend of visual, auditory, and spatial information.

## 2 Adding Virtual Objects

Once the environment is mapped, virtual objects are placed into that space, and their location is anchored using a tracking system.

## 3 Adjusting for Perspective and Occlusion

The virtual objects are adjusted to account for factors like perspective and occlusion to give the user a realistic, blended view of the mixed environment.

# Mixed reality algorithm



# Future Developments for AR and MR

## 1 Technological Advancements

Advances in 5G, edge computing, and spatial computing will enhance the AR and MR experience, delivering higher-quality visuals and faster processing times.

## 2 Business Applications

AR and MR will bring significant benefits to numerous industries such as automotive, aerospace, construction, and education, enabling new solutions and improving existing workflows and processes.

## 3 Social and Cultural Impact

AR and MR will transform social and cultural interactions, leading to the development of new forms of communication and user-generated content.



# Conclusion

## Exciting Times Ahead

The future possibilities of augmented reality are nothing short of astonishing.

With the rapid advancement in technology, the boundaries of what we can do with AR are practically limitless.

## Revolutionizing Industries

AR is transforming the way we interact with our environment, and as a result, it is changing the game in diverse industries, including healthcare, education, entertainment, and more.

## Bridging Realities

AR is the bridge between the virtual and physical worlds, enabling us to interact with each other and engage in new and fascinating experiences that blur the borders between fact and fantasy.